

## **502 STRUCTURAL PLATE PIPE, PIPE-ARCHES, AND ARCHES**

Prior to fabrication of the structural plate sections, shop drawings, and detailed erection instructions (showing the position of each plate and the order of assembly) are submitted to the Resident Engineer for review. These documents are in turn forwarded to the Project Designer for their review and comment.

Proper plate lapping shall be followed during erection. In some cases, the structure plan may call for various lengths of bolts for the different parts. A bolt length that will result in a full nut grip is required. The structure should be assembled with as few bolts as possible until all the plates are in place. Three or four untightened bolts placed near the center of each plate along the longitudinal and circumferential seams are sufficient. After several rings have been assembled, the remaining bolts can be inserted, always working from center of seam to corner of plate. Corner bolts should be inserted only after all other bolts are in place and tightened. After all the plates have been assembled and bolted, the nuts are to be tightened progressively and uniformly, starting at one end of the structure. When a power wrench is used, high torque is not required. Uniformity of tightening is more important than high torque. The minimum and maximum allowable torque depends upon the type of structural-plate. The specified torque range for aluminum structural-plate is 100 to 200 foot pounds (135 to 270 Newton meters), but the torque range structural plate with steel bolts is 100 to 300 foot-pounds (135 to 400 Newton meters). For inspection purposes, the acceptable torque should be within the specified range but, as stated before, uniformity of tightening is more important than high torque. Do not overtighten. The tightening sequence must be repeated to ensure that all bolts are tight. The Contractor should use a calibrated torque wrench.

Some damage to galvanizing generally occurs during structural plate erection. Repair of minor damage with two coats of zinc paint, or hot asphalt paint is permitted. Damage sometimes occurs around bolt holes when they are being aligned during bolting. Zinc paint should be on hand at the beginning of erection so the damage can be corrected as it occurs.

When specified, strutting shall be done according to the Project Plans and Standard Specifications.

Equally placed layers of backfill, on either side of the structure, are very important to prevent warping and movement.

Arches have a tendency to shift if backfill is uneven. The specification requirements for backfill sequence are to be followed carefully to minimize stresses. Heavy loads must be kept away from structural plate installations. Extra depth of fill over the structure is necessary to carry construction loads.

Although the structural plates are made from heavy gage metal, the ends of beveled sections can be easily damaged so extra care should be taken when backfilling. Consult the reference section at the end of this chapter for additional information on good installation practices.